

It does not seem likely, however, that the investigation would lead to interesting physical results, because this kind of motion is essentially dynamically unstable.

Towards the end of the same article there occurs the following passage:—

"The old idea that a ship (or more correctly a totally immersed body, such as a fish) encountered a mysterious resistance in addition to the mere friction of the molecules on its sides, is now known to have been a pure delusion."

This statement appears to me either erroneous or very misleading. The resistances to the motion of a ship have been classified under three heads, viz., wave-making resistance, eddy-making resistance, and surface-friction.¹ For a totally-immersed body the wave-making resistance is non-existent, but Mr. Preston would appear only to take notice of the last of the three. Now whilst for a body with "fair lines," such as a fish, the eddy-making resistance may be small, yet if the lines are not fair it may be very large. Thus a fish leaves scarcely any wake, whilst an oar leaves a very great amount of disturbance.

Helmholtz, Kirchhoff,² and Lord Rayleigh³ have made some interesting hydrodynamical investigations on the resistance suffered by a vane exposed to a current, on the hypothesis that in the wake of the vane there is dead water, separated from the moving water by surfaces of finite slip.

It has been already noticed that such a motion is dynamically unstable, but there is in many respects a remarkable accordance between the resistance as determined by this theory and that found experimentally,⁴ so that it seems probable that the actual stable motion of flow, with eddies in the wake, does not differ very much from the theoretically unstable motion, with dead water in the wake. It will be noticed that this theory of resistance, which gives approximate results for bodies with very bad lines, such as flat vanes, actually entirely neglects surface-friction, to which Mr. Preston's statement would seem to refer the whole resistance.

G. H. DARWIN

Trinity College, Cambridge, May 27

The Inevitable Test for Aurora

IN reference to Prof. Piazzi Smyth's courteous criticism of our communication to the Royal Society on the aurora borealis, we regret that we are unable to say whether the critical citron line, to which he directs attention, was present or not in the spectra of the electric discharges in atmospheric air from which we deduced the probable heights of auroral displays. The experiments quoted were made without reference to the aurora, and this particular line was consequently not sought for, nor indeed have many measurements been made of the spectra of discharges in atmospheric air, on account of the time required and consequent great consumption of the life of the battery which such observations entail.

WARREN DE LA RUE

73, Portland Place, W., May 29 HUGO MÜLLER

Cloud Classification

THERE is a proverbial objection to "looking a gift-horse in the mouth," and M. Poëy's Cloud Book is such a valuable addition to the scanty literature on the subject that it would be highly ungracious to make captious objections to his views. On the other hand, M. Poëy, when he differs from others, puts forward his views with such fairness and courtesy that I believe he would be the last man to deprecate full discussion.

Allow me then to put in a plea for certain old public servants, that they should neither be cashiered altogether, nor transported to strange regions, without full examination into their character and their merits.

First, then, for the *stratus*.

M. Poëy—happy man!—has carried on his observations under tropical skies and in the clear atmosphere of Paris. Had his lot been cast on the clays and gravels of the London basin I venture to think that he would have regarded the "stratus" with more respect, if with no increase of affection. He would have had frequent opportunities of observing it—at times resting entirely on the ground,⁵ at others rising with a clearly

defined lower and upper {surface, a few feet (or even inches) from the earth, cutting the taller trees in a horizontal line, leaving their tops and bottoms free, and then being gradually dissipated, to be absorbed in the warmer air or to form *cumuli* at a higher elevation. He could hardly have failed to recognise it as a clear and distinct variety of *cloud*, the lowest in altitude of all the family, but none the less a member of it. If every cloud which has contact with our baser earth is to be cashiered on that account, what will become of M. Poëy's own *cumulus* on Plate XV.? Every mountaineer knows to his cost that if he happens to be on the mountain where such a *cumulus* is resting, he will be enveloped in a fog undistinguishable from what he finds on the Thames marshes.

Whether, on the other hand, it is desirable to use the term "stratus" for clouds in a totally different sky-region, which differ both in their origin and their nature from the true "stratus," is a question too long to be fully discussed here.

Next with regard to the *nimbus*.

M. Poëy's view appears to be that Howard's term applies to an isolated shower-cloud, and is unsuitable for a rain-cloud over-spreading the sky. After careful reading of M. Poëy's remarks on the "pallium," and comparing them with Howard's description of the "nimbus," I entirely fail to see where lies sufficient difference to consign the "nimbus" to oblivion; and I can only imagine that M. Poëy has taken his idea² of what Howard meant almost entirely from the illustration, without noticing that Howard first describes the forming and behaviour of the cloud overhead in words curiously similar to those which Poëy himself uses for his "pallium," and then says, "But we see the nature of this process more perfectly in viewing a distant shower in profile." This clearly shows that the illustration was only chosen as the easiest form in which the cloud, *vel nubium congeries*, could be depicted, while the context guards completely against the name being limited to an isolated shower-cloud.

It would occupy too much space to place the descriptions of the two *savants* side by side, but I think that any one who will take the trouble to read the two together can hardly fail to see that Howard's "nimbus" fulfils all that Poëy describes as the rain-discharging cloud, including the upper "veil,"² or pallium of cirrus, the lower "sheet,"³ or "pallium" of cumulus, and the "lower clouds arriving from the windward," which "move under this sheet and are successively lost in it" (Howard, p. 11; compare Poëy, Plate XII.). In fact, to use an expression frequently employed in the discussion of patents, you can take the description of the one inventor and "read it on to" the drawing of the other, or *vice versa*.

M. Poëy's term "pallium" is certainly expressive, and will probably make itself a home in cloud terminology; but it appears after all only to mean that a certain modification over-spreads the whole or a large part of the sky (compare Howard, p. 11), and does not by any means cover that combination of clouds which produces rain ("nimbus.")

I must leave it to a future time or to other pens to discuss the merits of the "cumulo-stratus," and pass on to examine shortly M. Poëy's views about the "cumulus." The Rev. W. C. Ley, in his review of M. Poëy's work, in your pages, has already pointed out the illogical nature of the author's repeated remark that the "cumulus" only exists in the horizon, forgetting that a cloud which is on the horizon of one place must be in the zenith of another. Now I venture to suggest that this curiously-distorted mental view affects M. Poëy's classification far more than appears at first sight. If clouds are considered not objectively according to their whole form and structure, but subjectively as they present themselves to an individual observer, we naturally need new modifications as the clouds are viewed in different positions. Are not many of the clouds which M. Poëy calls "fracto-cumulus" simply "cumuli" viewed from beneath? Just as (to borrow a simile from Mr. Ley) an elm-tree seen from beneath presents a spreading, ragged edge, and shows the blue sky through its interstices, whereas on the horizon it appears compact, rounded, and sharply defined.

May I add a practical suggestion as to the popular terms proposed by M. Poëy on p. 39? These terms are put forward as an alternative to the scientific Latin names, for the use of *non-scientific observers*, who may be of great service in collecting information at out-stations where no trained meteorologist is at hand. It is therefore all-important that they should be as short,

¹ See Poëy, p. 33.

² "At a greater altitude a thin light veil," &c., Howard, p. 11, and again, "superne cirrata," p. 4.

³ "The lower clouds . . . form one uniform sheet," p. 11.

¹ Froude, *Proc. of Roy. Inst.*, December, 1876.

² "Math. Vorlesungen," 21st and 22nd lectures.

³ *Phil. Mag.*, December, 1876.

⁴ In particular Lord Rayleigh's investigation throws light on the theory of the balanced rudder.

⁵ Howard's Essay says, "its inferior surface commonly" (not "invariably" or "necessarily") "rests on the earth or water." P. 7, Edit. 1868.

plain, and simple as possible, conforming as nearly as may be to the popular terms in use, and above all that there should be nothing to mislead an ignorant person. Now I would ask what idea is conveyed to an ordinary unscientific mind by the term "snow-sheet"? The name is perfectly correct if read in the light of M. Poëy's explanation; but to an average lighthouse-keeper or coastguard it would certainly convey the idea of a so-called "pallio cumulus," ready to discharge snow, and would be used accordingly.

"Wind cloud" appears also distinctly misleading. To most minds it would, I believe, imply a cirrus or cirro-cumulus, as being the harbinger of wind. We have two excellent names in common use—"scud" and "rack,"—either of which would serve.

"Stratified cloud" is a very vague term, applicable to many varieties besides "cirro-stratus."¹

Objections might also fairly be raised against "Belt cloud," as compared with the familiar "Noah's ark" which Poëy himself quotes elsewhere, and to the "Globular tempestuous cloud," as a very cumbersome term, although a correct one.

It is to be hoped that all these details will be fully discussed before M. Poëy's suggestions are either admitted into general use, or, on the other hand, too readily rejected. E. II.

Walthamstow, Essex

NOTE.—The references are to Howard's *Essay on the Modifications of Clouds*, third edition, Churchill, 1865, and to Poëy's *Comment on observe les Nuages*, Paris, 1879.

"Chipped Arrow heads"

IN a number of NATURE (vol. xx. p. 483) which only lately reached us here I read an interesting account of Mr. Cushing's researches into the manufacture of flint weapons as practised by aboriginal tribes; and as I have had many opportunities of observing the method by which the Fuegians of Magellan's Straits fashion their glass arrow-heads, a few words on the matter may not be without interest to some of your readers.

One of the indications of the increase of traffic through these Straits which has of late years taken place is that empty bottles are now to be found about the shores of those anchorages which are used by passing vessels as stopping-places for the night; and bottle-glass is consequently the material used by the Fuegians of the present day, to the exclusion of obsidian, quartz, or flint. The following is the process:—A fragment somewhat approaching to the shape of the intended arrow-head is grasped firmly in the left hand, while in the right hand is held an old iron nail stuck into a short wooden handle. The fingers of the closed right hand are turned upwards, and the point of the nail is directed towards the operator's breast. He then presses with great force the blunt point of the nail obliquely against the edge of the piece of glass, when a thin scale flies off towards him. One side of the edge having been bevelled in this way, the glass is turned round, and the opposite edge flaked off in a similar manner. Working the edges alternately in this way, the glass is readily brought to the required shape. The fashioning of the point is the most difficult part of the process, the formation of the barbs being easily effected.

I have seen a native thus make a large arrow-head out of a piece of broken pickle bottle in about half an hour. The glass is never struck, but is fashioned entirely by pressure. After a little practice I succeeded in making fair imitations.

I find, moreover, that the iron tool above mentioned can be dispensed with, and that the flaking may be effected by pressing with an angular flint or with a piece of bone, which were probably the methods used by the Fuegians before they possessed any iron implements. K. W. COPPINGER

H.M. Surveying Ship *Alert*, Swallow Bay, Straits of Magellan, March 21

Cup and Ring Stones

IN reply to Mr. Middleton's letter I beg to say that the Ilkley cup and ring stones have been carefully described and illustrated in a paper read by me before the Brit. Archæolog. Assoc. (see *Journal B. A. A.* for 1879, p. 93).

Further information will be found in Sir Jas. Simpson's work on the subject, which forms the appendix to vol. vi. of the *Proc.*

¹ I am not aware whether *Geschichtete Wolken* is an accepted term in Germany. In the Bernese Oberland a very expressive name is used, *Gestreifte Wolken*, only too well known to mountaineers.

Soc. Ant. Scot., and in Prof. Boyd Dawkins' "Early Man," p. 338.

In a large number of instances cup and ring marks have been found on the stones of cists, stone circles, and menhirs. It would therefore appear that they are connected with sepulchral rites. Cup marks are found in Scotland, Ireland, Wales, Northumberland, Yorkshire, Cumberland, Lancashire, Switzerland, Sweden, and India (see Rivett Carnac's papers in *Journal of Asiatic Society of Bengal*, 1878-9). I should be glad of evidence of their existence in Derbyshire and elsewhere in the South of England. J. KOMILLY ALLEN

23, Maitland Street, Edinburgh

Songs of Birds

CAN any musical reader of NATURE transcribe for me the notes of the king lorry (*Aprosinectus scapularis*)? May not the *major* and *minor* keys of the cuckoos noticed by John Birmingham be sexual characteristics? The males are believed to exceed the females in number in the proportion of four or five to one, and, if this be so, the male note must be heard more often than the female. The "jerkiness of style" in the *major* cuckoo, as described, suggests that the performer is a female. A. N.

C. W. HARDING.—The teeth belong to a young horse—not yet "in mark" (*Equus caballus*). Their geological horizon appears uncertain, and they are as likely to be historic or prehistoric as pleistocene.

COMPARATIVE ANATOMY OF MAN¹

III.

Modifications of the Negro type.—At several parts of the equatorial region of Africa, from the Gulf of Guinea to the White Nile, indications have been met with of a small race of negroes, sometimes so small that the name of pygmy may truly be applied to them, differing from the ordinary negro in the short rounded form of the head. These bear some resemblance to the diminutive members of the oceanic black races who inhabit some parts of the East Indian Archipelago, especially the Andaman Islands, and to whom the name *Negrillo* is now generally applied, and Dr. Hamy, who has collected together all the evidence at present accessible as to their existence, has proposed to distinguish them by the term *Negrillo*. The Akkas of Schweinfurth appear to belong to this race. In many districts they are more or less mixed with the ordinary negroes, and their physical characters are therefore obscured, but some skulls from the West Coast of Africa in the collection of Dr. Barnard Davis bear a striking resemblance to those of the Andamanese, and have a cephalic index of 80 or upwards.

The greater part of Africa, between the equator and the most southern parts, where the Hottentots and Bushmen dwell, is inhabited by negroes, who for linguistic reasons are grouped together, and separated from the more northern tribes, and are now generally known to ethnologists by the name of *Bantu*. Their range seems to have extended southwards in comparatively recent times, encroaching upon that of the original inhabitants. They are a pastoral people, warlike, energetic, and intelligent, owning large herds of cattle, and living in villages composed of a number of beehive-like huts. The southern Bantu, who at present are the best known, from their vicinity to the British and Dutch settlements of South Africa, are divided by Fritsch into 1. The Ama-Xosa, who inhabit at present the south-east portions of the Bantu territory, adjoining the sea, between the Cape Colony and Natal. To these the name *Kafir*, derived from an Arabic word applied to them as unbelievers or heathens, is commonly given, but the name is sometimes used in a wider sense for the Bantu negroes generally. The Ama-Xosa include the well-known tribes of Gaikas and Galeikas, with whom we were at war in 1877. 2. The Ama-Zulu,

¹ Abstract Report of Prof. Flower's lectures at the Royal College of Surgeons, March 1 to March 19, on the Comparative Anatomy of Man. Continued from p. 80.